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ABSTRACTS

AGRICULTURAL INTELLIGENCE

GENERAL INFORMATION

Report of the California Department of Agriculture for the Period ending December 31, 1921. — HECKE, G. H., in *The Monthly Bulletin, Department of Agriculture, State of California*, Vol. X, Nos. 11-12, pp. 559-569. Sacramento, Ca., Nov-Dec. 1921.

The general agricultural depression following the war has probably been felt to a lesser extent in California than in most parts of America, is being due largely to the excellent organisation of the co-operative marketing associations and of the prominent independent commercial concerns. The year 1921 has been exceedingly important from the point of view of agricultural and horticultural legislation. Some of the decrees established have meant the addition of entirely new activities to the work of the Department, for example the Pure Seed Law authorises much needed standardisation of agricultural seeds and a Seed Testing laboratory is now established in co-operation with the United States Bureau of Plant Industry.

As regards the new laws affecting the livestock industry, the most important are the co-operative systems relating to tuberculosis which are under control of the Federal State.

The centralisation plan has now been completed and the diagram illustrates the present organisation of the State Department of Agriculture. The recent addition of the Department of Weights and Measures and the State Market Commission and Fish Exchange has resulted in broadening the scope and activities of the Department. The important steps taken with reference to Standardisation, Pest control and quarantine etc. are dealt with under the various sections. These reports of

DEVELOPMENT
OF
AGRICULTURE
IN DIFFERENT
COUNTRIES

the different division leaders demonstrate the marked development, in every case attributed to the loyal co-operation of the various agencies concerned.

DIVISION OF PLANT INDUSTRY.

Bureau of Pest Control. — Activities have been continued along the following lines:

a) Regulation of traffic in walnuts to control the spread of codling moth (1);

b) Investigation of the possible improvement in the treatment of nursery stock to prevent the transport of certain insect pests. Work carried on by the Bureau includes treatment of apple, pear, peach, plum, almond, apricot, cherry, olive, orange, grapefruit and lemon. A number of standard liquid insecticides and fumigants were used, applied under vacuum conditions. Results have furnished a basis for the development of methods which should prove very helpful with reference to a number of present day problems. Special work has been undertaken with citrus nursery stock, which was first defoliated, then treated with hydrocyanic gas for 1 hour under reduced-pressure conditions (ratio 1.03, sodium cyanide to 100 cub. ft. in a 27 inch. vacuum). This method proved very successful in the destruction of red scale (2);

c) Control of insects affecting dried fruits. Satisfactory reports have been received from fig, date and raisin packers after their installation of fumigators. Experiments have been made with a view to ascertaining the value of fumigation of dates in vacuum with sulphur dioxide and their resistance to such treatment without commercial injury. In various experiments gas was generated by the utilisation of pure liquid carbon bisulphide at varying strengths. No injury was evolved from the standpoint of excess residue.

Reports as to the designs put forward for the fumigating apparatus are given, but all work of this kind should be considered of a preliminary nature.

d) Investigation as to the possibility of a satisfactory treatment of potatoes to destroy tuber moth (3). Complete details of the work done will be presented in a special report.

e) Work with the California Almond Growers' Exchange, in connection with the control of insect pests of almonds. The Indian moth (4) has been a constant source of trouble in the packing houses. A successful treatment has been effected to eradicate this pest, namely the application of heat to the infested part of the building. The details of the procedure are given.

f) Sterilisation of picking boxes. The treatment by steam to destroy pests has met with considerable success.

g) Grasshopper poison.

(1) *Carpocapsa pomonella*. — (2) *Chrysomphalus aurantii*. — (3) *Phthorimaea operculella* Zell. — (4) *Plodia interpunctella* Hbn. (Ed.)

Field work in Insect control. — Attention has been turned especially to the control of the following pests: — Strawberry root weevil (*Otiorhynchus rugifrons*); strawberry leaf weevil (*Paria canella*); pear thrips (*Lathrips pyri*); pear mealybug (*Pseudococcus maritimus*), etc.

The introduction of the South African black scale parasite (*Aphidius umshurni*) is very evident, and a systematic distribution as well as the development of further quantities of this parasite has been in progress. Other beneficial insects are also reported, amongst them the Citrus feeding mealybugs, *Cryptolæmus montrouzieri*, the Sicilian internal parasite, *anaomastix abnormis*, the Cotton cushion scale predator, *Vedalia cardinalis*. Experiments are also in progress in connection with red scale parasites and the Coleopteron steely-blue ladybird (*Orcus chalybeus*), *Rhizobius lophanthæ* and *Chilocorus biolinerus* have already given good results. The Chalcid, *Aphelinus diaspidis* is also under close observation. Rodent control work has been prosecuted vigorously throughout the State and an intensive campaign against coyotes and other predatory animals has been inaugurated. Full details relative to these points are given.

BUREAU OF STANDARDISATION.

a) *Fruit and Vegetable Service.* — At present this Bureau is engaged in the determination of workable standards for grapes and other delicious fruits.

b) *Port inspection service of fruits and vegetables.* — This service places at the disposal of growers and shippers of perishable products, expert, disinterested, official inspectors from the Department of Agriculture who issue certificates covering the carload as a unit.

The seed potato certification service has been extended and enlarged during 1921, and also the grain and warehouse inspection service and seed standardisation and inspection service.

BUREAU OF PLANT QUARANTINE. — In addition to the maritime port inspection, activities have been extended to the inspection of automobile traffic, a new field in quarantine work and one which should be given consideration in the future. Quarantine orders have been revised as conform to changing conditions brought about by the spread of pests and diseases in other States.

REPORT OF THE VITICULTURAL SERVICE. — Details are already published in the Annual Grape Report and data relative to economic returns will shortly be published by the California Crop Reporting Service of the State Department of Agriculture.

Data is given relative to the frost damage to the 1921 grape yield. No further progress has been made as regards control of diseases and pests. The nematode *Heterodera radicicola* (potato eelworm) has caused serious damage lately.

Grape phylloxera (*Phylloxera vastatrix*) is prevalent and widespread throughout the State, and the most effective methods adopted are: 1) the grafting on resistant roots when the soil is susceptible to phylloxera infestation; 2) planting in very sandy soils or loams not susceptible

to infestation. All other practices offer little guarantee of longevity. The hot water treatment of rooted vines and cuttings when applied with care is effective as an agent of disinfection and if universally adopted would undoubtedly retard attack and restrict the spread of this disease. The Federal quarantine regulations although causing inconvenience to vine growers by barring the use of rooted vines and consequently delaying the planting of vineyards, is an advantageous institution in that it is a safe measure of protection against the introduction of pests and vine diseases which if once acclimatised would be so costly to control that vine cultivation would be restricted to the more highly profitable localities.

DIVISION OF CHEMISTRY. — A comprehensive inspection service has been inaugurated relative to the manufacture and sale of materials used in the control of diseases and pests, weeds and rodents, the last two of which have not hitherto been covered by any law.

A co-operative arrangement has been effected with the Division of Animal Industry and the Division of Chemistry for the equipment and operation of a laboratory for the bacteriological and chemical examination of dairy products.

An inspection service has also been at work for the administration of the Fertiliser Law. Briefly stated, the activities of the Division are now as follows:

1) Administration of Fertiliser Law: — a) Registration and licensing of manufacturers and dealers; b) collection of tonnage taxes; c) sampling and analysing of all brands of commercial fertilisers offered for sale and publication of the results; d) prosecution of those who sell commercial fertilisers without license or payment of tonnage taxes; e) prosecution of those who sell labelled commercial fertilisers below the guaranteed analysis; and of those who sell animal manures containing added sand or water.

2) Administration of the Economic Poison law: — a) Registration and licensing of manufacturers and dealers sampling and analysing substances offered for sale in the State to be used for the control of insects, fungi, weeds and rodents and publication of the results; c) prosecution of those who sell economic poisons without license; d) prosecution of those who sell adulterated or misbranded economic poisons.

3) Chemical and bacteriological examination of dairy products as required by the Dairy Service of the Division of Animal Industry.

4) Testing and certification of all instruments used by creameries to determine the percentage of butter fat in milk and cream.

5) Analysis of miscellaneous substances required by other Divisions of the Department.

This has included the analysis of fruits for the Bureau of Standardisation, and toxicological examinations of stomach contents of various organs of cattle and other live stock, feed and water, in suspected cases of poisoning.

6) Testing of instruments and supplying standard solutions for

County Horticultural Commissioners, test determination for the ripeness of oranges, and instruction of officials and their deputies and inspectors in the technique of making the so-called 8 to 1 test.

7) Public service: a) Official and private analyses of economic products, fertilisers and allied substances, such as agricultural lime, gypsum and so called soil stimulants.

b) Analysis of milk and cream for industrials.

c) Correspondence, personal visits and conferences pertaining to the above-mentioned activities.

d) Investigations: — a) Chemical and bacteriological investigations to improve the quality of dairy products and to prevent and detect fraud.

b) Chemical investigations to obtain information when needed for the enforcement of the various laws.

DIVISION OF ANIMAL INDUSTRY. — In addition to the important work as affecting the live stock industry concerning tuberculosis eradication, disease investigations have been in progress and certain diseases such as the Texas fever tick and sheep scab have been reduced to a minimum. A list is given of the various diseases investigated and the eradication results.

Data are given concerning Dairy Inspection work, cattle protection service and cattle statistics, and the newly-established meat inspection law.

DIVISION OF WEIGHTS AND MEASURES. — Inspections have been made in the various counties, cities and towns of the State in respect to weights and measures, to the sale of goods, wares, merchandise, commodities and foodstuffs in containers. These inspections are made in the various localities during their busiest seasons. Each state institution inspected at least once annually and all scales, weights and measures are tested and corrected, which enables an accurate check to be made on incoming supplies. Further details are given with reference to the work of the "public weighmasters"; the Net Container Law, *i. e.* the marking of containers with net quantity of contents; the gasoline and oil measuring devices; bread standardisation etc.

DIVISION OF MARKETS. — The efforts of this division have been concentrated largely on the proper and equitable distribution of the food supply. A survey of activities during the latter part of 1921 is made.

Crop Report for 1921, and final estimates of acreage production and yield of the principal crops of the State of California. — The tables in this report summarise the production of the various crops. Revised figures of acreage and production for 1919 and 1920 are included for comparative purposes.

— *Review of the Agricultural Situation in North West Morocco.* — SAULNIER, J., in *Revue Agricole de l'Afrique du Nord*. Year 19, No. 75, pp. 10-13 + map. Algiers, 1921.

The "Gharb" area under discussion, occupies the whole of the North West of French Morocco. Bounded on the north by the Klott, on the south by the Béni-Hassen area, on the east by Djebala and Riata and on the

west by the Atlantic Ocean, this region forms an immense plain with the Chatba Mountains as a central ridge running from west to east.

Three types of soil quite distinct from each other are to be found namely: — 1) Sandy soils ("rimet"); 2) black soils ("tirsse"); 3) white soils ("desse"). The sandy soils are prevalent in the northern section of the area. Beneath the surface soil is found a layer of blue clay containing traces of glauconite, and below this, sand again, and then gravel. It therefore belongs to the Upper Pliocene group, and is especially noticeable in the Maarif and Anabsa plains. The comparatively pure sand extends as far as Oued Bon Harira, but further south the colour changes to black, perhaps owing to the abundance of humus. Here and there in the sand, if the clay layer is at all deep, marsh ("merdja" formation is obvious, and this formation is associated with almost the entire coastal area (*merdja rassed daoura*) and in certain portions inland (*merdja marklane*). The marshes are to a large extent dried up in the summer.

Further South, in the mountainous region of Chatba and Djeb Dall, there is a variation of black, sandy, whitish and greyish soil. At Ain-el-Gsob, certain molluscs have been observed, and varieties of *Pecten jacobaeus* and *Ostrea* spp. (Pliocene). Dwarf palms are to be found over a limited area.

On the mountain spurs, the black soil extends to within 2 or 3 km of Oued Sebou, where it is replaced by white soil of a very colloidal nature.

CLIMATE. — The temperature of the 'Gharb' is very mild; snow is scarcely ever seen in spite of the neighbouring high altitudes (Dj. Alem, 2300 m.; Dj. Iziren: 2500 m.). The rainfall is fairly regular, and the atmosphere comparatively moist, as a result of the situation of the country near the sea and the N. W. winds.

AGRICULTURE. — The soil in the extreme north is unsuitable for cultivation and only small quantities of barley and sorghum are grown for local consumption. Wheat is cultivated only on the border of the oases, where alluvium deposits occur. In the Maarif and Anabsa plains where humus is combined with the sand, melons, water melons, and gourds are grown.

On the Chatba Mts. cultivation is met with only in the hollows of the foothills. On black soils of the Souk-el-Arba and Daouia plains the chief crop is wheat, and the native activity is more marked. Further south on the Sebou white soil areas, very large tracts are covered with wheat and barley.

As regards the quality of the crops, it is noted that the wheat is frequently very fine on the black soils; durum wheat is rarely seen; but barley is also of good quality but not equal to the wheat. Fungous diseases are rare; rust and smut have been noted in a few instances.

LIVE STOCK. — The chief interest of the native from the agricultural standpoint is bound up in stock raising, more especially in the north. Special attention is paid to cattle raising, and then to horses, sheep and pigs.

Cattle. — These are of medium size ; certain remarkably fine specimens exist, particularly amongst the bulls. The colour varies, generally from red to deep black. Stock raisers concentrate their attention both on butcher's stock and working animals ; the first remain inactive in herds. At about 2 years old, the natives proceed to castrate, following somewhat crude method (" *martelage* ") (doug): they beat the testicles of the animal with a switch, until they are reduced to pulp. The animal becomes feverish for a few days after the operation, and then recovers its equilibrium and fattens rapidly. Only on a few occasions has death occurred as a result of this method. No shelter is given to the animals ; they are merely enclosed in a large dug out (" *asses* "), made in the form of a regular trapezium to prevent escape.

Up to the present, stock raising has been left entirely in the hands of the natives ; the Europeans merely purchase the animals and leave them in the care of the natives and take no further responsibility. The following form of contract is in vogue.

" The native takes $\frac{1}{3}$ of the profits, is responsible for stolen beasts, and if one dies has no right to cut up the animal before the European owner has seen and investigated the cause of death etc. (This latter condition has scarcely ever been included in the contracts between the natives themselves). The European takes $\frac{2}{3}$ of the profits.

Milk cows. — These are of superior quality, and give from 4-5 litres of milk per day. Cows from Southern Morocco are not often transported to the North, as the change of conditions has a deleterious effect on such animals, the death rate amounting to 60 %. Some difficulty is found in distinguishing northern and southern animals on the market. The natives consider that they can distinguish them by the teeth, but this is doubtful. Certainly on the Gharb markets, these animals are extremely thin.

Sheep. — Sheep raising is especially developed on the banks of the Sebou. The animals are well made and stand high, resembling closely the merino sheep, but the wool is much less waved. The wool is generally of quite good quality. When improved, the Gharb breed should prove more profitable even than it is at the present time.

Horses. — The animals are of medium size, the colour varies, and no particular colour can be said to dominate. The natives completely misunderstand the castration of horses. Horse breeding is not extensively practised, but following ancient custom all who can afford to do so buy single horse or mare, and breeding is confined to these strictly limited cases.

In Souk-el-Arba, a remount dépôt exists consisting of 10 Algerian stallions. The native horse is feeble and resembles more the draught-horse than the Algerian type. It is known by the natives as " *caïdar* " pack-saddle horse.

Further exploitation in horse rearing will certainly be forthcoming, owing to the extensive pasture land in the Gharb area.

Pigs. — It appears that even before French influence existed in

the Gharb, pig rearing was a native custom. At present the same method is adopted of confiding the care of the animals to the natives as is with cattle, and a similar division of profits between European and natives. At present, two or three large exploitation schemes are being carried out and pigs are being raised in large numbers, and the future looks decidedly promising.

TRADE. — Trade has reached a comparatively advanced stage; the chief markets are situated in Lala Mimouna or Jemao and Souk-el-Arba. The cattle trade is most important, although sheep are to a certain extent dealt with. Development in trade is dependent on stock breeding.

INDUSTRY. — This is almost non-existent in the Gharb. The only purely local industry lies in the manufacture of the *gelabas*.

POLICE AND LAW. — Two military posts are in existence, at Sebou and Arbaona, situated near Klott. These contain information bureaux from which officials are sent to inspect and control the local "caïds", which form the native law courts.

In conclusion, the author expresses the opinion that there is a great future for the Gharb region, especially on the completion of the Tanger Fez line, as it is one of the most interesting districts in Morocco. Agriculture which up till now has not made any distinct progress should shortly make decided advances, provided that energy is shown in the introduction of modern methods.

M. L. Y

681 — **Agriculture in Sergipe (Brazil).** Note from the President, Dr. José Joaquim Pereira Lobo (1). — *Mensagem apresentada à Assembléa legislativa, em 7 de setembro de 1921, ao instalar-se a 2.ª Sessão ordinária da 1.ª legislatura, pelo Coronel Dr. José Joaquim Pereira Lobo, Presidente do Estado*, pp. 17 + tables 21 (besides text). Anacôpi, Imprensa Oficial, 1921.

Note from the President of Sergipe, Dr. J. J. PEREIRA LOBO addressed on September 7, 1921, to the Legislative Assembly, on the occasion of the opening of the 2nd Session of the 14th Legislature, which is concerned especially with the political and economic situation. Certain extracts have here been made of outstanding importance and giving a general idea of the agricultural conditions and hygienic arrangements in this State.

AGRICULTURE AND STOCK RAISING. — The evident importance attached to agriculture in Sergipe is demonstrated by the export data which chiefly concern farm products.

(1) For Development of Agriculture in Brazil, see: R. June 1921, No. 592; R. July 1921, No. 700; R. Nov. 1921, No. 1078; R. Feb. 1922, No. 135. Also: *International Institute of Agriculture, International Review of Agricultural Economics* Yr. XII, Nos. 1-2, Rome, Jan.-Feb. 1921, containing an important bibliographical record. The following references are worthy of note: Armand LÉDERT, *Organisation Agricole au Brésil*, Antwerp, Laporte and Dosse, 1913. — Notes on institutions established by the Federal Government, in support of agriculture, stock raising and agricultural industries. — Dr. Idelfonso SIMONS LOPES, *Economical Notes on Brazil*, Ministry of Agriculture, Industry and Commerce, Rio de Janeiro, Villas Boas, V. C., 1919. (Ed.)

In 1918, the exports amounted in round figures to 22 million *milreis* (1 *milreis* = 2, 24 at par); in 1919, 21.3 millions; in 1920, 10.4 millions.

In 1920, 93 % consisted of the following products: sugar (14 625 tons); cotton yarns (1501 t); cotton (770 t); rice (3374 t); salt (17 127 t); skins, salted or dried (245.4 t); sugar comprised 53 % and cotton yarns 31 % of the total value of exports.

Several sugar factories are in existence, the most important being the "Engenho Central de Riachuelo", the third largest in Brazil; — others are stationed at Aracajú, Estancia, San Christovan, Villanova, Propriá, and in addition to these are several other less important concerns.

The Government endeavours to encourage cotton growing (1) by the distribution of selected seed, etc.; this crop however owing to the existing cotton crisis, is on the downward grade, and in 1921, the estimated yield showed a decrease of 40 000 bales of 75 kg. below the preceding year, that is a ratio of 1 : 3.

The recent visit of the Cotton Commission under the direction of Mr. A. S. PEARSE (2), brought into evidence the excellent quality of the Sergipe cotton, attributed to the length of the fibre. According to the report of the Commission, the "Riqueza" or "Verdão" is the best quality cotton in the State: the fibre is 38 mm in length, strong and superior texture, very resistant to the "lagasta rosea" (*Pectinophora gossypiella*). Seed sorting is practised as a preventive measure against this pest. At present there are 72 gineries containing in all, 48 sorters and 28 gins for cleaning purposes.

In 1920, 8 cotton fabric factories in the State had utilised 80 % of

(1) See 1) Ministério da Agricultura, Industria e Commercio, Decreto No. 14 117 de 27 de março de 1920. (Cria o Serviço do Algodão), Rio de Janeiro, Imprensa Nacional, 1920. — 2) Ministério da Agricultura, Industria e Commercio, Serviço do Algodão, Relatório apresentado ao Dr. Idelfonso SIMÕES LOPES, Ministro da Agricultura, Industria e Commercio, pelo agrônomo William W. COELHO DE SOUZA, Superintendente do Serviço, Rio de Janeiro, Papclaria Americana, 1920. — 3) Ministry of Agriculture, Industry and Commerce, Board of Information, Possibilities of Cotton Culture in Brazil, by W. W. COELHO DE SOUZA, Rio de Janeiro, Papclaria, Brazil, 1920. — 4) Ministério da Agricultura, Industria e Commercio. Serviço de Informações, A cultura do algodoeiro no Brasil, pelo agrônomo W. W. COELHO DE SOUZA, Rio de Janeiro, Imprensa nacional, 1921. — 5) Sociedade Nacional de Agricultura, Missão Internacional algodoeira, sua recepção na s. n. de agricultura, Conferência do Sur. A. S. PEARSE, Rio de Janeiro, Typ. Revista dos Tribunaes, 1921. — 6) A. S. PEARSE, Brazilian Cotton, Manchester, Taylor Garnett Evans and Co., 1921 illustr. — 7) Dr. Deoclecio DE CAMPOS, Delegate of Brazil, Rapport sur la Statistique du Coton présenté à l'Assemblée Générale au nom du Comité Permanent, Rome, International Institute of Agriculture, May 1922. — 8) Prof. Umberto RICCI, La Conférence cotonnière mondiale de Liverpool, Manchester, Int. Inst. of Agriculture, Bureau of Statistics, Vith General Assembly, May, 1922. — 9) Dr. Deoclecio DE CAMPOS, La Conférence internationale cotonnière de Rio de Janeiro (Oct. 1922) Communication presented to the Permanent Committee, Int. Inst. of Agriculture, 31 Mai 1922. — 10) Dr. Deoclecio DE CAMPOS, O Algodão no Brasil e a Conferencia mundial algodoeira de Nova-Orléans, Rome, June 1922. (Ed.)

(2) See R. Dec. 1921, No. 1220. (Ed.)

the production, i. e. some 48 000 bales of 75 kg. To encourage cotton growing, the President has put forward the following propositions: 1) To fix by decree the official types of cotton, handing over the classification to the care of a competent expert, and charging the Inspection of Agriculture with the taxation, the grading and the selection; 2) to exempt for ten years from the tax on manufactures where municipal authorities have installed a first quality hydraulic press capable of reducing a bale of 180 kg to a maximum volume of 0.35 cub. m.; 3) to extend this exemption also for 10 years, and from the export tax for 5 years to the first factory which shall be established in the State for: fine thread (no. 24 and above); English thread; the weaver adapted to these threads; bleaching, tinting, preparation etc.; the threading machine, weaver or other up to date method suitable for the manufacture of flannel; the Government being obliged to contribute 20 % towards the expense of installation, and to exempt from the tax on manufactures for 10 years the ginneries which are employed for seed sorting and commercial grading.

Rice cultivation is still limited to very primitive methods, and consequently the yield varies from year to year.

Tobacco, maize and coconuts hold an important place, and the export of these products steadily increases. It may be estimated that as much as 2647 hl. of vegetable oils were exported in 1920.

The Government encourages the farmer, by the distribution of imported machines and agricultural implements, at cost price and free from customs charges. At the "Centro-Agricola", several crops are on trial: manioc, maize, forage crops, etc. and also at the "Horto botânico". The "Zootechnological Postes" has received a subsidy of 50 000 *milreis* (1920) for improvement purposes; this "posto" is an important asset in connection with stock raising, and is a recognised resort of animal breeders. The export of hides and skins has been on the increase for several years.

Lines of communication. — The lack of communication continues to render stationary the economic situation. It appears probable that once the obstructions at the mouth of the river Japarutuba are removed, the immense valley, where the land is particularly fertile, could be utilised; already several factories are established there. This scheme, which has been submitted for approval to the Chamber of Deputies, would render the river navigable, and would keep back the floods, which each year, cause destruction over a wide area planted with sugar cane, and would permit the cultivation of immense areas.

Education. — Sergipe State possesses at the present time not counting the numerous free establishments — 271 institutions: the "Athena Sorcipense" a secondary school for boys; the "Escola normal" for teachers providing a course covering a period of 4 years; 7 evening schools for adults. The State Primary schools are increasing slowly; in 1921, in the whole State there were 7855 pupils of both sexes. The illiterate are in the majority. The President proposes to add to the girls' section of the schools, a second year for children who do not

pass on to the normal school for teachers, and who have the wish to qualify in domestic management, typewriting, needle-work, music, etc.

Sanitary conditions. — The population is on the decrease, due chiefly to emigration.

The sanitary arrangements are still open to much improvement. Even in the Capitol itself, the drainage system is incomplete and the drinking water arrangements are poor. The unfavourable season, from the hygienic standpoint is the winter, when the marsh fever, influenza, small-pox etc. play havoc.

In Sergipe, as is the case in the whole of Brazil, steps are being taken to improve conditions.

The President draws attention to the high infant mortality, due chiefly to the ignorance of the mothers.

F. D.

682 - *Notes on the Agricultural Conditions in the Italian Colonies.* — *Ministero delle Colonie, Ufficio Affari Economici, Bollettino di Informazioni*, Year X, No. 1, pp. 1-16, plates 6, Rome, Jan-Feb. 1922.

TRIPOLITANIA. — The Mediterranean has a remarkable influence on the coastal region, which possesses a typical maritime climate; in the area adjacent to the desert, the forces which influence the maritime climate are in opposition with those of the desert climate, and a certain modification results. Inland, it is quite hot, arid, and typically desert.

Annual average rainfall: 200 to 400 mm. The fauna is very varied; livestock occupy an important position, and tunny fishing and the sponge industry are given much attention and are remunerative.

The flora is characterised by: 1) The date palm, and some 284 999 plants, young and fully developed are to be found in the oasis on the coast of Tripoli, Tagiura, Gurgi and Gargares; 2) the olive, which is the sole fruit grown in the non-irrigated area now under cultivation. Several wild plants either aromatic or with oleaginous seeds, or barks utilisable for tannins and dyes, are also to be found.

Agriculture is the chief industry and the small holder leads the way. Cereals, table grapes, henna, which is largely exported to Algeria, the central market for this crop, and olives grown in the coastal plains and in the Djebel, are all recognised crops. The progress made in olive cultivation, the attention given to new plantations and the improved methods of oil extraction have all contributed to increased yield during recent years, and the oil production will in future be estimated as sufficient for local consumption. The extension of plantations and the further improvement of industrial methods should make it possible in the near future to have a reserve which may be utilised for export purposes.

The decree issued by the Government on November 15, 1919, provides land concessions under certain regulations. Up till now, taking into account the minor importance of such land, which can be certified as available, about 10 concessions have been made, of limited area, comprising 3000 hectares.

Facilities of various kinds are agreed upon by the Colonial Government authorities.

Tripoli is the Tobacco factory centre, and large plantations exist in the neighbourhood

CYRENAICA. — Temperate climate, which permits settlers to enjoy living conditions not unlike those of Southern Italy. The average annual rainfall varies from 200 to 600 mm.

As in Tripolitana, the fauna is distinctly varied: The livestock is, however, of finer quality, especially the sheep which possess superior wool. The sponge industry is most important, as regards both quantity and quality.

The flora is very rich, and includes all types characteristic of Italian plants especially on the upper plateaux. The plants most abundant are the broom, *Pistacia Lentiscus* cypress wild olive, carob and oak. The date palm, except in the oasis of Derna and the palm grove at Bengasi, is less luxuriant than in Tripolitana. The cultivated olive covers a very large area but is not so widely spread as the wild olive to which attention might be given.

Farming is the leading industry in Cyrenaica. The production of cereals is important, particularly barley. In 1919-1920, the yield was about 1 000 000 quintals, of which about 160 000 qx. were imported into Italy, for food purposes and for malt, which has taken the place, to a certain extent, of malt previously imported from other countries. Some 150 000 qx. were exported elsewhere.

Very few land concessions are granted by the Government in view of the small amount available for the purpose. On the other hand, the farmers, either in groups or as Co-operative Societies are, in conjunction with the native owners, facing the problem of putting to useful purposes the large tracts of first-rate cultivable land with easy access to the coast, which is now in possession of the native tribes.

The collaboration of the native tribes with the settlers indicates that the results will be satisfactory.

The facilities and premiums have been arranged and competitions organised, in accordance with existing conditions, by the Colonial Government, with a view to agricultural development and stock raising.

In the north of Gasr el-Mugtar, on the Tripoli borderland, in Birte extensive sulphur deposits are found, which are easy to work although situated the surface. The sulphur obtained is usually transported to Bengasi and sold in the local markets. Considerable quantities are exported to Egypt, and employed in the treatment of "gale" of camels.

ERITREA. — In the plain, on the sea level, the climate is tropical; in the Upper plateau, the climate resembles that found in temperate regions, with marked differences between the warm and the cooler hours of the day. In the intermediate area, between the plateau and the sea, wide variations in temperature are met with according to the seasons; the days may be subject to torrid heat and the nights are almost as cool as in the upper plateau. On the inland lower plateau the day temperature is equal to, and sometimes higher than that on the coastal lower plateau, and the nights are comparatively cool. The lowest average annual rainfall is recorded at Assab, viz 28.8 mm.; the highest at Adli Ugri, 788.5 mm.

The fauna and flora are very rich and very varied. The doum palm, the broom and even aloes, *sanssevere* sp. are remarkable for their abundance. Cattle and sheep are numerous; a large majority of the native population devote their attention to stock raising.

The most important industry of Eritrea from the economic standpoint is agriculture, and the flora has great possibilities, considering the geographic situation of this region, and the evident advantages of having both a temperate and a tropical climate. The river reservoirs of Mt. Belesa, the irrigation barrages of Zula and Haut-Falcet, are intended to raise the value of land which when irrigated will render these almost arid regions available for valuable tropical crops.

A well-planned exploitation of wild and cultivated fibre plants (agave and *sanssevere*), camphor, aloes, and tan bark plants is being undertaken. Plantations of tobacco and coffee are beginning to give satisfactory results.

The yields from the doum palm which grows wild and vigorously in the Barca valley and its tributaries and in the valleys of the Gasc and the Setit, are exploited to a large extent. The nut from the fruit is utilised in the ivory button industry in conjunction with the American corozo. Agordat and Cheren are the chief trade centres for this article.

The first machinery installations for the stripping of the agave and dealing with the fibre have given excellent results.

There is considerable amount of State Land available especially in the Lower-Plateau. Land concession is regulated by special provisions introduced by the Land Organisation approved by Royal decree on January 31, 1909, No. 378.

All concessions are subject to yearly dues, which may be redeemed on certain conditions. Exemptions are allowed to farmers on special conditions.

There have been up till now 170 concessions referring to 17 350 hectares in all.

Sheep and cattle are numerous and constitute an important part in trade of this Colony. The much-valued skins, represent, alone, one of the chief export articles. The preserved meat and slaughter-house by-products are dealt with at Sembel (Asmara).

As regards hunting, elephants are found in Cunamo and Tacazzé, lions in Assaorta and in Barka Megareb, leopards and panthers, hyenas and jackals everywhere, hippopotami in Gasc and Setit, alligators in several rivers and in the pools of torrents; large numbers of apes of all kinds and species, especially noticeable owing to the damage done to doum palm fruits and tamarisks; antelopes, wild boars and various types of birds. All these animals are of commercial value in connection with Zoological Gardens in other countries.

Indications of phosphorite and potassic salt formations have been noted in Damalias

SOMALILAND. — On the coastal regions, the monsoon winds tends to maintain an almost uniform climate throughout the year: the daily temperature varies between 22 and 30° C, but inland, where the effect of the wind is less and the atmospheric humidity low, the temperature varies from 18° C during the night to 35° C and even to 40° C during the day.

The average annual rainfall, in the more favoured regions of Bénadir, does not exceed 350 mm. The factor which influences the vegetative development is not the temperature which is equally distributed during the seasons, but the water supply, dependent on the rains coming from Uebi Chébeli and Djouba, and which represents the most valuable asset of the Colony.

The fauna and flora are uniform throughout the region, except in the very fertile areas, along the Djouba and to a certain extent on the banks of the Chébeli, where the splendour of the tropical vegetation is a source of admiration during the whole year. The most common plants are the doum palm, the baobab and resinous acacias.

Livestock is the most important industry, and half the population, almost exclusively composed of natives, is thus occupied. The region best adapted to stock raising is in Bénadir, where the pasture land is luxuriant, and the stock generally allowed to remain in the wild state, except in the district round Ubi Chébeli, starting from Andegle, where only semi-wild. A census taken on February 1 1920, demonstrates that in Bénadir only, were 2 101 178 camels, 124 461 cattle, 1 666 308 sheep.

Native agriculture is of poor quality, and the economic results are characterised essentially, except perhaps in the case of cotton, by the production for local consumption rather than for export. The cultiva-

tion of dourah, typical of arid zones, of "nembe", of native cotton, of maize, of sesame of haricots, occupies a good half of the population grouped in villages, on the bank of the rivers Djouba and Chébeli, or in fairly scattered groups in Dafet, Baidoa, and round Itala.

In Somaliland, the two great rivers should play a considerable part in the improvement of land values, permitting the introduction of tropical crops important from the industrial standpoint, especially cotton, sugar cane, tobacco, sesame and kapok; this however, naturally entails capital and European technical direction, with manual labour supplied by natives, accustomed to the climatic conditions. White men cannot do heavy, outdoor work owing to the climate and to obtain this manual labour without difficulty a successful step has been taken in securing the collaboration of the native element with Italian settlers. In this way, the "Società Agricola Italo-Somala" has found no difficulty in the carrying out of important barrage schemes and utilisation of the waters of Uebi Chébeli for the irrigation of newly exploited areas in the Scidle-Moyen, and plantations will shortly be laid out.

There is plenty of State land available. The concessions are regulated by special provisions contained in the Colonial Land Organisation approved by royal decree on June 8, 1911, No. 820. The concession costs demand only the payment of a modest annual rent which may be redeemed. Exceptions are made for certain small holders, who are exempted from payment.

The concessions so far accorded, include just over 5000 hectares. Apart from this, there are numerous tracts of land, belonging to natives, which have already been developed by the Italian settlers.

Just as in Eritrea, the land is rich in wild beasts. Elephants, rhinoceros, buffaloes are found near the two great rivers, especially the Djouba, also hippopotami, and a large number of crocodiles; numbers of lions and leopards are found in the Balli region; antelopes, gazelles, wild boars everywhere, all of commercial value for parks, circuses, zoological gardens, as well as for their skins.

Fish appear to be abundant and help to feed the coastal population, and after pickling in brine serve as a valuable export product, and afford by-products.

G. A. B.

683 - **Importance of Technical Supervision on Sugar Plantations.** — ROSENFELD, A. H., in *The International Sugar Journal*, Vol. XXIV, No. 279, pp. 140-143. London, March 1922.

With a view to securing better yields by ascertaining, under technical supervision, the maximum potential yield, fertilisers, irrigation and drainage requirements etc. of each acre, the Sugar Planters' Association in Honolulu has conducted a very interesting demonstration, and one pregnant with possibilities of super-intensive sugar production. The most outstanding result has been that for the last two years, the cane and long ratoons in this test have averaged 12 tons of sugar per acre, some areas yielding more than 15 tons per acre.

Assurance has been given that these results are neither accidental, nor are impracticable methods employed. These are enumerated as follows: 1) extraordinarily close technical supervision of each acre; 2) in-

tensive fertilisation, through ascertaining the *practical limit* and then applying required amount of fertiliser; 3) very careful irrigation, but no excessive quantities of water; 4) careful decision as to the proper time for cessation of irrigation and ripening the cane before harvesting. The last three on every sugar plantation are to a large extent contingent upon the first, a fact which hitherto has been too much overlooked. Apart from some of the most progressive countries such as Hawaii and Java, real technical supervision of sugar cane plantations has been almost unknown. The reported results in Honolulu should, however, demonstrate clearly the utility of technical care applied to production.

M. L. Y.

684 - The "Office Régional Agricole" in the South of France. — *Bulletin Trimestriel de l'Office régional agricole du Midi*, pp. 1-10. Marseilles, Jan. 1942.

AGRICULTURAL
INSTITUTIONS

The agricultural bureaux consisting of a Department Office and an "Office régional" (District Office) were inaugurated on Jan. 6, 1919 (1) for the intensification of agricultural production.

The "Office régional" in the South of France covers the following area: Basse Provence (Bouches-du-Rhône, Var, Alpes-Maritimes); Lower valley of the Rhone, and of Durance (Drôme, Ardèche, Vaucluse and Basses-Alpes); the Southern vineyards (Gard, Hérault, Pyrénées-Orientales) and la Corse, which all together constitute the 8th district.

Headquarter: are established at Marseilles, temporarily at the Hôtel de la Préfecture (Direction des Services agricoles).

The directing committee consists of:— Inspector general of agriculture for the district concerned, two delegates from each of the departmental offices. The Directors of the Agricultural Service assist at the meetings for consultation purposes.

The agricultural offices are corporate bodies and have financial liability,

(1) The law of January 6, 1919 inaugurated the district agricultural offices and the department offices. The former represent each agricultural inspection centre. All possess a single organisation consisting of a council which is expected to meet at least twice each year; before December 15, propositions etc. are put before the Ministry of Agriculture, and further schemes are subject to the decision of the Ministry. Every year, the district office submits a written report concerning all work undertaken and also that carried out by the departmental offices. The Inspector General of Agriculture sees that the decisions made by the various Offices are carried out and surveys the work of the various experiment stations.

The council, in each department, consists of 5 members, 2 at the most occupy the position of "conseiller élu", the others represent the principal agricultural groups. The reunion of the Council is held on the convocation of the Prefect. The Council revises its line of activity in accordance with the suggestions made by Agricultural associations. The programme is examined by the Office régional and definite arrangements are made only in conjunction with the ministerial decision. Every year, the Departmental Office presents a detailed report on the work and this is transmitted through the Office régional to the Ministry of Agriculture. Departmental inspection is made by the Director of Agricultural Services in conjunction with the decisions of the Departmental and district Offices.

They have the right to take the initiative as regards improvements in the departments or in the district.

ACTIVITIES OF THE OFFICE REGIONAL AGRICOLE IN SOUTHERN FRANCE.

— The activities of the Office are concentrated on: 1) the co-ordination of the work of the departmental offices; 2) the organisation of district experimental stations; 3) the co-ordination of scientific research etc. in the interests of agricultural progress and the protection of crops in the district concerned.

Co-operation of different branches of work of the Departmental Land Offices. — Definite steps are taken at the General Assemblies where each of the Departmental Committees present an account of the work undertaken and the schemes in view. The Office régional has up till now directed the Departmental offices along the following lines: organisation of seed testing establishments; distribution of seeds and plants of pure types and well selected; joint control of diseases and pests; inoculation of herds; institution of itinerant lectures (wheat, livestock); reimbursement of losses of animal breeders; participation at competitions and demonstrations with a view to implement improvement etc.

District Experiment Stations. — The existing number of stations is not less than 30; and they absorb a considerable part of the credits of the Office régional. The work of this Office is therefore clearly differentiated from that of the Departmental Office which concentrates its attention on popularisation of information supplied by the Office régional the experimental work being carried out on a uniform plan though under different conditions. These Stations are concerned with crop production of especial interest in southern France, and with stock raising, particularly sheep and pigs. Their schemes of work are checked by the Office régional after submitting to Committees consisting of 2 members of the Departmental Office interested, the President of this Office, the Director of Agricultural Service, the President of the Agricultural Association, an expert eminently suited to study the question, and the General Inspector of Agriculture for the District.

Crops. — Olive-growing in 5 centres: Villeneuve-Loubet (Alpes Maritimes), Le Luc (Var), La Fare (Bouches-du-Rhône), Lédanon (Gard), Pilacanal, Piscialetto and Ajaccio (Corse). M. BONNET, chief of the olive-growing association at Marseilles is appointed as director of this work. The programme is the same everywhere; the study of the best pruning methods, the effect of ploughing and treatment of surface soil, control of collar rot, pests (olive fly etc.), propagation of interesting varieties, treatment of old trees, use of fertilisers, and should the occasion arise, the improvement of machinery etc. in the neighbouring oil mill. Nurseries have been started at Ajaccio, Antibes and Aix.

Fruit growing:— at Solliès-Pont and Fréjus (Var), St. Vallier, Albon and Lévevron (Drôme), Prades (Pyrénées-Orientales), Cabannes (Bouches-du-Rhône) and Ajaccio (Corse). Experiments are in progress to ascertain the variety best adapted to local cultivation, the best manner

the treatment of both plant and animal pests. Attention is also given to packing, transport and utilisation of the products.

Vine growing:— A National Experiment Station has been established at Montpellier. Stations have also been set up at Saint Marcel d'Arèche (Ardèche), Sallèles d'Aude, Lafond de Long, Carcassonne (Aude), Bimieux en Carmargue, Berre (Bouches-du-Rhône), Roquebrune (Var), Gard and Ajaccio. A further station will shortly be established at Perpignan (Pyrénées-Orientales). Tests are being made with various stocks or local varieties, grafting, direct production, manure, control of pests.

Market gardening and flower growing:— at Avignon (Vaucluse) and Perpignan, and probably shortly at Hyères (Var). Experiments are being made on the best varieties, manures, new varieties, control of pests.

Flower growing is specialised at Antibes. It is intended to establish a centre for aromatic flowers such as lavender in the Basses-Alpes.

Potatoes: at Alboussière (Ardèche) and Volx (Basses-Alpes).

Cereals: — at Maninet near Valence where (Drôme), very interesting results have already been obtained. Experiments are also in progress at Aix (Bouches-du-Rhône), Cuxac-Cabardès, and St. Michel de Lanes (Aude).

Live stock. — **Sheep:** In order to maintain a pure race in Southern France, the Office grants a subsidy for stock upkeep in the special sheepfolds at St. Andréol-en-Quint, for the Quint breed, and in La Motte Verdun (Drôme), for the Corse breed and at Ajaccio for the production of Roquefort Cheese. A centre for the Larzac breed is proposed in Hérault.

Pigs:— the Marseillaise breed is being improved at Aix-en-Provence.

Silkworms: At Oraison (Basse-Alpes), experiments are being made in the feeding of silkworms owing to the efforts of M. GRAMER.

The Office régional also undertakes research work of general interest and contributes to the popularisation of motor ploughs, etc., and has brought to the public notice a machine adapted to the oil industry, etc.

As regards propaganda, the Office régional has assisted in the publication of several pamphlets dealing with the district, and intends to organise agricultural conferences illustrated by cinematograph. A central information bureau will shortly be established in Marseilles which should be useful also to the Departmental Offices, etc.

In addition, it has been decided to publish a quarterly Review dealing with the more interesting work in hand, with a summary of the various branches of newly-started work in other districts.

P. C.

5 — **The National Agricultural Conference in the United States.** — *Journal of Farm Economics*, Vol. IV, N. 1, p. 61-63. Lancaster, Pa., Jan., 1922.

The National Agricultural Conference, called at President HARRISON's request by Secretary of Agriculture WALLACE during the week beginning January 23, served to focus attention of the country on the agricultural situation.

A total of 336 delegates were in attendance, comprising representa-

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EXHIBITIONS,
MEETINGS,
CONFERENCES

tives of farm organisations, agricultural journals, State agricultural colleges and departments, the seed, fertilizer, machinery, and allied business interests, and agricultural interests generally throughout the country. The intention, as expressed by Secretary WALLACE, was to bring together a group thoroughly capable of passing on the many phases of problems affecting agricultural production and marketing.

The Conference was addressed upon opening by President HARDING.

The first two days were mainly devoted to addresses by agricultural leaders from many sections of the country, presenting the facts as to current conditions and outlining some of the most important needs and problems before the country.

Following this the Conference broke up into twelve committees. For three days committees met, reported, and their reports were debated by the main body.

While the Conference presented a clear-cut picture of the depression which has affected agriculture for the past year, its recommendations were not directed entirely to relief of an emergency as such. Perhaps its most significant work lay in presentation of fundamental economic relationships between agriculture and other elements in the country, and in attempts to formulate some constructive lines of policy with regard to the national welfare.

A considerable number of resolutions were presented in committee reports and passed. In general, however, the outstanding action of the Conference revolved about four main propositions, namely: More adequate financing for agriculture; insistence on cheaper transportation and distribution costs; development of cooperative organization and freedom from legislative restraints thereon; recognition and fair adjustment of the farmer's economic status relative to other groups.

Some of the chief resolutions passed included:—

Enactment of laws, state and national, authorising cooperative marketing.
Amendment to warehouse act facilitating the financing of stored crops and better protection of such crops.

Better enforcement of State cold-storage laws and the enactment of a Federal law.
Establishment of more Federal standards for farm products.

Passage of laws prohibiting interstate traffic and manufacture of filled milk.

Legislation compelling truthful labeling of raw and manufactured products such as truth-in-fabric bill now pending.

Investigation by the Interstate Commerce Commission of the advisability of extending preferential rates to agricultural products for the purpose of promoting foreign trade.

Extension of the provision of the Webb-Pomerene Act which provides for combination of concerns for export trade in order to meet competition of consolidated purchasing of other countries.

Tariff protection for agriculture equal to that extended to other industries, establishment of a tariff board to administer a permanent flexible tariff law with an anti-dumping provision.

Importation of potash free of tariff.

Increased support of the International Agricultural Institute at Rome and appointment of agricultural attachés to foreign embassies.

Improved and greatly extended market reports on crops and live stock and the taking census every fifth year.

Congressional legislation to meet the need for agricultural credit running from six months to three years such as is provided in the recommendations of the Congressional Joint Agricultural Commission; if this form of credits be not made available, the War Finance Corporation should continue to function until such time as may seem necessary and proper.

Amendment of the Federal Reserve Act so as to give Federal Reserve Banks authority to buy and sell notes secured by warehouse receipts covering readily marketable, non-perishable, agricultural staples or live stock, of the kinds and maturity now eligible for redi-count.

Recognition of agriculture, merchandising and manufacturing in the selection of the Federal Reserve Board and directors of Federal Reserve Banks.

Increasing the individual borrowing limit from Federal Farm Loans from \$10,000 to \$15,000.

Congressional amendment to the joint-stock land banks so the banks may issue bonds to amount of twenty times their capital.

Extension of the activities of the Federal Farm Loan System so it may include the commodities which the farmer usually puts up as collateral.

Reduction of freight rates immediately to rates effective August 25, 1922.

Federal aid in highway building and farm-to-market roads and continuation of this policy for a definite period, so States may plan adequate cooperation;

The acceptance of HENRY FORD's offer to lease land at Muscle Shoals, Alabama, and manufacture fertiliser.

Retaining all bureaux of Department of Agriculture in that department.

Establishment of a National Agricultural Advisory Council.

Appointment of a National Commission to classify land areas. Determination of policy of reclamation which shall be coordinate with the need for agricultural land and other economic conditions.

Effective legislation for stopping devastation of forests and a national consciousness of forest problems.

Extension of research work and increase of area devoted to forests.

Improvement of rural conditions and farm home life.

More research and agricultural educational activities, particularly an enlargement of agencies for gathering and disseminating accurate statistics on production, marketing, and economic phases of agriculture in general.

G. A. B.

86 - **The Smithfield Club Show in London and its Lessons.** — I. *Live Stock Journal*, Vol. XCIV, No. 248, pp. 583-593. London, December 9, 1921. — II. VOITELLIER, CH. and GRAN, A., in *Revue de Zootechnie*, No. 4, pp. 299-321. Paris, January 1922.

I. — A comparison between the Cattle Show organised by the Smithfield Club in London, in December 1921, and the preceding shows held here during the last century reveals the great changes that have taken place in English stock-breeding in that period.

According to the reports of the earlier Shows, most of the cattle exhibited were from 10 to 12 years of age, for the breeders found that the animals after having been worked for several years, could be fattened quickly at grass and sold to the butcher at a profit. On the other hand, the cattle exhibited of late years, have been much younger, as it has become customary to slaughter animals between 15 months and 2 years

of age. This change has had no unfavourable effect on the size of the individual animals, or the weight of the quarters: indeed, the chief statistics dealing with these points (published in 1872 and 1908), demonstrate that in the 50 years previous to 1908, the number of butcher's beasts, reckoned by the head of horned cattle, rose 750 000 which represents an annual increase of 200 000 tons of meat.

This shows that it is economical to kill cattle between the ages of 15 months and 2 years. According to some experiments made in the United States shortly before the War, 15 months appears the best age limit, for a greater increase of live-weight with smaller consumption of food can be obtained before 15 months than at any other period of the animals life.

II. — The Annual Show of fat cattle held in London by the Smithfield Club is justly regarded as one of the most important exhibitions of the results of British Stock-breeding. The authors therefore were anxious to visit the Show in person and study it exhaustively, more especially as some innovations have been made such as making new classes for animals of less than 15 months old. These classes are open to most breeds and to exhibits in the Carcass Division.

The authors examine successively the constitution of the Smithfield Club, its financial resources, the programme of the Annual Show, the organisation of the latter and finally, the lessons to be learned from the Show.

THE SMITHFIELD CLUB was started in 1798, and its statutes have been but slightly altered. At the present time, it boasts of nearly 1400 members of which 350 are Life Members, while the rest pay an annual subscription of one guinea. Its sphere is limited to stimulating competition in the rearing and fattening of animals for the butcher.

The financial resources of the Club. — These are confined to members' bequests made and profits realised on previous Shows. These revenues only amount to some £500. The Club receives no grant from the Government to defray administrative or exhibition expenses.

The Smithfield Club, on the occasion of its annual Show, is paid by the Society owning the Agricultural Hall a fixed sum in lieu of the gate-money which belongs to the said Society, and in addition a given proportion often amounting to a considerable sum, when the takings exceed a certain figure. They reached £1883 in 1920. To these receipts must be added the entrance fees for cattle and the fees paid for reserved stands by manufacturers of agricultural machines, seedsmen, and merchants taking part in an Agricultural Show, these amount to about £4 000; also the proceeds of the sales of catalogues, which reached £140 in 1920. If the members' subscriptions are taken into account the total sum available for the 1920 Show was £7240.

The Club paid out of this sum all the organisation expenses, the fees of the attendants and judges (£520) and the prizes awarded to exhibitors (£3820). This year about £5100 was given in prizes. In 1920, the budget closed with a profit of £1680.

This proves that official Shows, if well organised and held on premises free of rent, should be no charge upon the State finances.

THE GENERAL ORGANISATION OF THE SHOW. — The Smithfield Club Show has been held since 1862 in the same place where it is held to-day, viz., the Agricultural Hall at Islington, a building equidistant from the battoirs and from the Smithfield Meat Market.

The animals are not placed in stalls but are fastened to a rail about feet high, so that they can be examined with equal ease both before and behind. The cattle lie on a wooden floor, about 6 in. from the ground and wide enough to allow for plenty of litter behind the cattle; this arrangement has the advantage of preventing the litter being carried away by the feet of the visitors. The Show building remains clean and there is no absence of dust such as rises when the floor is sanded. The feeding troughs, although movable, are fastened to the lowest iron bar.

The sheep-pens, which are also made of iron hurdles, are relatively wide; this allows of both sets of animals being seen from the front when the pens are arranged in double rows.

Cards nailed on to small boards are suspended from a rod fixed above the rows of animals at a height of about 10 ft. On the cards are written the class, breed, number, age, in years, months and days, and the live weight of the animals, together with the names of the breeder and exhibitor; to these are attached cards showing prizes gained by the animals, in this way, the Show serves an educational purpose.

The exhibition of dressed carcasses takes place in an adjoining hall. Cards similar to those described above give the net weight of the meat, the weight of the fat, offal, tail, and hide, in the case of cattle, and the weight of the meat, fat, pluck and fleece in that of sheep. The weight of the meat and pluck alone are given for swine.

The dressed poultry are placed on their backs upon a slab with their heads hanging down, so that only the breast and feet are visible, unlike the practice in France. The method of exhibition shows off the breast development better than any other.

Programme. — This contains two large divisions, the Live Stock Competition and the Carcass Competition respectively. The animals shown live the first day are slaughtered the second day; the dressed carcasses being exhibited on the third day.

In the live stock division, there are 13 subdivisions for pure-bred animals (to each breed are allotted 3 to 5 places) and 3 subdivisions for cross-bred animals, the total number of classes being 58. The class for young bulls below 15 months old is an innovation. The limit of 15 months, which has been the subject of much argument, is still considerably discussed, and a proposal has been made to reduce it to 12 months. All the animals must be castrated before they are 9 months old. In the case of ten breeds, the cattle must be entered on their respective Herdbooks, or have in their pedigree four successive pure-bred males.

Sheep. — These animals are allotted 89 classes for 17 breeds and for cross-breeds. As a rule, there was for each breed one class for

sheep born in 1921 and 1920 respectively. The animals must belong to a registered breed and have been castrated before the age of 5 months. The sheep are shown in lots of 3.

Pigs. — There are 27 open classes, 16 for 9 pure breeds, 2 for crosses, 3 for piglings weighing less than 45 kg., one for young pigs weighing less than 64 kg. and 5 for pigs of less than 9 months. The latter are exhibited singly, whereas the animals in the preceding classes are shown in lots of 2. The conditions of registration in the Herdbook are the same as those for cattle. The boars must be castrated before they are 3 months old.

In the Carcass Competition, there are 4 classes for cattle, 6 for sheep and 4 for pigs. The classes are as follows :

- bulls, or heifers, of less than 15 months ;
- bulls over 15 months and of less than 2 years ;
- bulls of over 2 years and of less than 3 years ;
- heifers of not over 3 years.

This classification is not advantageous for heifers less than 2 years of age, though they are most valuable animals from the cattle-breeding standpoint.

In the 6 classes of sheep a distinction is made between those born in 1921 and 1920. The competitions are for long-woolled breeds and short-woolled breeds or their crosses respectively.

There are 4 classes for pigs, which are classified under the following heads : pigs with a live weight of less than 45 kg. ; pigs with a live weight below 90 kg. ; pigs less than 9 months of age and below 135 kg. in weight ; pigs weighing between 72 kg. and 109 kg. and producing the best bacon.

The authors draw attention to the fact that the Carcass Competition is not as important as the Live Stock Competition as the number of classes in the former is smaller and the prices offered are of less value.

Although the conditions requiring registration in the Herdbook or a pedigree certificate are great guarantees against fraud, other additional measures are taken to ensure that the age of the animals shall not be incorrectly given. The regulations empower the Veterinary Inspector and stewards to disqualify any animal whose dentition proves its age to be more than has been stated.

One of the most interesting secondary features of the Show is the exhibition of dressed poultry. They are divided into 24 classes for pure bred birds and their crosses, thus affording an excellent opportunity of comparing the conformation of the different breeds. The fowls must be plucked, except for the head and neck, they must not be singed, or have their breast-bones broken. The prizes awarded in the poultry division alone amount to £132.

THE SHOW AS A WHOLE. — *Size of the classes.* — The size of the various classes in each division is almost the same, therefore there is little difference in the value of the prizes offered. When some breeds are more represented than others, this depends upon 5 classes being open to them instead of 3, which, is the usual number.

The large number of sheep in the Carcass Competition is chiefly due to 6 classes being open to them instead of 4 as in the case of the pigs.

After having examined the entry lists of the cattle, sheep, and swine, the authors come to the conclusion that in this Show, as in all other annual exhibitions, the number of animals competing is proportionate to the number and value of the prizes offered and that if the public are to be attracted and satisfied there must be a large number of classes.

Judging. — There is no jury. Two judges are appointed to decide the merits of the animals of one or several classes. The names of the judges are published when the programme is issued.

The judges carry out their mission according to their own pre-arranged plan. Should they fail to agree, they may appoint an arbitrator, who is called upon when occasion arises and decides the question and then retires. There are only 4 such referees for the whole Show, one for each class of live animals and one for the Carcass division.

There are thus only 44 judges. The Championship prizes are, however, always awarded in each division by 2 special judges appointed beforehand. They begin their work when their colleagues have finished judging the various classes, but according to the regulation hitherto in force they may not choose any animal as a champion of the classes, or breeds, which has been beaten at the present, or preceding Smithfield Show. This year, however, as in 1907, all the cattle competing for the highest honour of the Show had been beaten on some point, so that this regulation had to be suspended.

This method of awarding the prizes in competitions open to all breeds is much better than the plan formerly adopted in Paris, when a jury was formed composed of delegates from the jury judging the classes. But it entails the organising Committee finding two experts who have no special fancy for any particular breed.

Judging is carried out in the same way in the Carcass Division. Here, little attention is paid to early maturing and yield, the judges marking for quality of meat, proportion of fat, and the best cuts.

Comparison of breeds and classes. — When examined successively, the various classes of cattle are seen to have very similar characters. They seem all to have had a common origin, or to be nearly related. No doubt there is a large amount of Shorthorn blood in all the animals, or they have been selected to conform to a single ideal: body parallel-piped, short neck, chest projecting, rump line perfectly straight, upper and under lines parallel.

The cattle are rather slightly built, as compared with those of the best French breeds. This depends partly on the fact that none of the animals are over 3 years of age, but also upon the great predominance of cattle of average bulk. The live-weight at a certain age is not the only factor to be taken into consideration even in butcher's beasts, far less in exhibits at a Show.

If the live weights of the animals are compared according to the method adopted in England viz., reckoning the weight at birth as zero, it generally

happens that the younger the animals, the higher is the daily increase in live weight. If the class of bulls of less than 15 months is considered, it is seen that the differences in development are very small between one class and another.

The conclusion reached by the authors is that the Smithfield Club Show brings into prominence the relative reduction in bulk of the English breeds, but gives no means of judging of their earlier, or later, maturity. The only advantage they can discover in the reduction of bulk is the better conformation of the smaller animals. But from the butcher's point of view, heavy beasts entail lower general expenses for the same yield and an equal proportion of fat; they are also more profitable to the Cold Storage Industry, always assuming equal yields and the same amount of fat, than smaller animals. It has also been scientifically proved that the latter require more nutritive elements for their maintenance alone. The large improved French breeds can thus well stand comparison with the English breeds.

The authors say that these observations also hold good for the breeds of sheep and pigs, and their conclusions regarding these animals are the same as in the case of the cattle.

The English appear to share the authors' opinion where sheep are concerned and award higher prizes to large, less well-formed breeds, such as Suffolks and Cheviots (provided they mature sufficiently early and are very hardy), than to Southdowns. As the pigs are classified according to age, the development of each breed is best shown by the differences in the weight of the animals.

Carcass competition. — After examining the different classes the authors found that the prizes were awarded to the finest finished animals, whether cattle, sheep, or swine. Very fat animals are not sought after as much as formerly, hence there is no object in producing more than half-fat animals for the butcher. In judging the exhibits at the Show, more marks were given for the number of first-class cuts and the net meat return, than for fatness.

As regards the sheep, since the age of none of the animals in the classes was stated, the observations were limited to their conformation and the quality of the mutton. Southdown and Southdown crosses produce the best shaped legs of mutton with little bone and well-distributed fat.

Conclusions. — Although open to criticism on many points, the Show taken as a whole is of the greatest practical utility. It serves the interests of the breeders of pure-blood stock by demonstrating the meat-producing qualities of these animals. The over-fat condition of some of the exhibits may even be justified from this point of view. What appears to be merely a hobby often proves to have more practical bearing than is at first apparent.

In the Carcass Competition, the Show possesses within itself a useful check to any tendency to run counter to the pre-established object, for the value of the dressed carcasses can be as exactly determined as that of the live animals.

The two divisions of the Show are complementary.

F. S.

CROPS AND CULTIVATION

- 687 - **Correlation between the Temperature and the Dates of Flowering in New England, U. S. A.** — LYON, C. J. in *Torrey*, Vol. 22, No. 2, pp. 19-20. Lancaster, Pa., April 1922.

AGRICULTURAL
METEOROLOGICAL

Results of a series of observations made on the relation existing between the date of flowering of a large number of plants, and the temperature in New England (U. S. A.). The flowering period lasts from March for early-flowering species, till the end of June in the case of late-flowering species.

During the five years, 1917-1921, a positive correlation was evident between the date of flowering and the temperatures from March to June. Early flowering was very noticeable when the temperature was very high (1921), and the contrary effect was evident when the temperature was below the average (1917).

FRANCIS DARWIN arrived at quite different conclusions which contradicted any possible correlation between temperature and date of flowering.

G. A.

- 688 - **Methods of Studying the Concentration and Composition of the Soil Solution.** — PARKER, F. W. (Agricultural Experiment Station, University of Wisconsin), in *Soil Science* Vol. XII, No. 3, pp. 209-232, bibliography of 27 works. Baltimore, M. D., Sept. 1921 (1).

SOIL PHYSICS

A more exact knowledge of the soil solution is desirable for the study of many of the problems of soil fertility and plant nutrition. For this purpose several different methods have been used which may be classified into 3 groups: 1) water extraction method; 2) methods which aim at obtaining the true soil solution; 3) measurement of the solution directly from the soil. Several methods have been employed to obtain the true soil solution such as compression, centrifuging, suction and displacement. The last method consists of packing the moist soil in a cylinder provided with an outlet at the base, and coloured water, ethyl alcohol, or paraffin oil etc. may be used as displacing liquids. In certain cases a combination of the suction and pressure methods was employed with a view to accelerate displacement. Several suggestions have been made for direct determination of the soil solution, such as electrical conduction and freezing point methods.

All these methods have their disadvantages. The water extraction alters the equilibrium in the soil; it undoubtedly has a solvent effect; the results vary with the ratio of soil to water, the time of extraction, the effect of the carbon dioxide content of the water, as shown by MIRSCHERLICH.

The pressure method (applying a maximum pressure of 53 000 lb. per sq. in.) is only applicable to finer-textured soils, with a high moisture content and is liable to alter the physico-chemical equilibrium in the

(1) See R. Feb. 1919, No. 154; April 1920, No. 338. (Ed.)

soil (NORTHROP). This method requires a complicated apparatus. Even the centrifuge and suction methods are only applicable to soils with high moisture content and only small amounts of the solution are obtained.

As regards electric conduction etc. the results are affected by texture of soil and physical characters.

The ISCHEREKOV displacement method appears to be the most satisfactory and the author has selected this method for comparison purposes.

Glass percolators 2.75 in. in diameter and 15 in. depth were used; the bottom filled with a one-hole stopper. A small quantity of coarse quartz sand was placed in the percolator and soil then added. After packing, the displacing liquid was added and maintained at a depth of 2-3 in.

The extracts were made by adding distilled water and stirring in a large mortar for 3 minutes. After leaving 12 minutes, the mixture was filtered through Pasteur-Chamberland filters.

Freezing point determinations were made in the usual manner with a BECKMANN thermometer, and served as a means of determining the direct soil solution and also the concentration of the displaced solution and of the water extract.

Nitrates were determined colorimetrically; calcium, volumetrically, and organic matter by weight.

Ethyl alcohol, methyl alcohol, acetone and water were used by the author as displacement liquids. Ethyl alcohol gave the most satisfactory results and is very easy to test for its appearance in the displaced solution by means of iodoform reaction. The alcohol content in the filtrate possessed a very high concentration owing to the solvent action.

The composition of the soil solution obtained by displacement was not influenced by the displacing liquid used; the change therefore is not affected by the time of extraction.

The concentration of the displaced solution, all things being equal, was found to be inversely proportional to the moisture content of the soil. This agrees with the ISCHEREKOV observations. A comparison between the displacement method and water extraction shows almost identical results, the ratio between water employed and soil being 5 : 1.

As regards the freezing-point method, the results were very different from those obtained by calculation.

The depression of the freezing point has generally been greater than that of the displaced liquid. After numerous and varied experiments, the author concludes that the finely divided material causes this depression, probably due to capillary condition. A similar effect is produced with benzene and nitro-benzene.

Soils and well washed material freed from adherent moisture by centrifuging showed marked and nearly equivalent depressions of freezing point. This indicates that the moisture film adhering to solid particles in suspension opposes to a certain extent resistance to freezing. Depression of the freezing point is to a marked degree independent of

the dissolved material, but the hypothesis of BOTYROCOS and McCOR, (1) which assumes that a portion of the water in the soils is inactive and does not take part in the dissolving of salts in the soil, should not be upheld, as the displacement method indicates that all the water in the soil acts as a solvent. Soils with a high moisture content, but where the capillary condition is limited, gave results coinciding with those obtained by displacement, such results being of practical importance. The author strongly recommends the displacement method, which is the least involved and the most exact and which hitherto has been too much neglected L. V.

689 - **Use of Various Culture Media in characterising Actinomycetes.** — COXX, H. S., in *New York Agricultural Experiment Station, Geneva, N. Y. Technical Bulletin*, No. 83, pp. 1-26. Tables 7, Geneva, N. Y. April 1921.

The actinomycetes form one of the most numerous and interesting groups of soil micro-organisms; their colonies may comprise from 40 to 50 % of all the colonies developed on the Petri plates (COXX).

A large number of types occur in the soil and a study of the morphology and chromogenesis permits direct classification.

For some time they were grown on ordinary media, sometimes on the glycerin agar media: KRAINSKY seems to have been the first to call attention to the fact that media containing no protein are much better adapted to bring out the characteristics of the different species. Chromogenesis is more frequent and more typical and may be of three shades, depending on whether the colour is formed before aerial hyphae are produced, or in the mycelium, or in the media. The animal parasites do not appear to adapt themselves as readily as the saprophytic group to the simple media (without protein).

About 75 cultures were selected from 300 cultures obtained from various different soils. The formula which proved the most satisfactory for continued study was: agar-agar 15 gm.; glycerin 10 cc.; dibasic potassium phosphate 1 gm.; sodium asparaginate 1 gm.; water 1000 cc. This very simple formula gives characteristic and vigorous growth. Cultures which are not distinguishable in this media may be separated in a malic acid, or citrate media with glycerin, or in a medium adapted according to CZAPPEK's formula, modified by WAKSMAN.

The use of pure chemicals is advised and an exact measurement of the quantities of media employed, as the slightest error may have a marked influence on the results. A further study of the media is recommended.

L. V.

690 - **Depth for Sowing Grass and Clover Seed.** — WILLIAMS, R. D. (Plant Breeding Station, Aberystwyth), in *The Journal of the Ministry of Agriculture*, Vol. XXIX, No. 1, pp. 53-60 and No. 2, table 1, pp. 132-137. London, April-May, 1922.

Various opinions are held as to the most advantageous depth for sowing grass and clover seeds. To establish some definite basis on which to work,

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(1) See R. 1921, No. 597. (Ed.)

experiments were made recently in England with the following species (1): CLOVERS: 1) Red (*Trifolium pratense*), 2) White (*T. repens*). — GRASSES: 1) Perennial Rye Grass (*Lolium perenne*); 2) Cockstoot (*Dactylis glomerata*); 3) Meadow Foxtail (*Alopecurus pratensis*); 4) Rough Stalked Meadow Grass (*Poa trivialis*)

Seeds were sown at varying depths in pots, boxes and beds in a light loam, and the selected seeds were tested for germination before sowing.

RED CLOVER. — A comparison of results given at different depths proved very conclusively that the seeds should never be left uncovered, not only owing to the fact that uncovered radicles of seedlings take a hold on the soil with difficulty, but also because the marked effect on percentage of germination e. g. Pot cultures sown on the surface gave a 52 % germination (14 days after sowing) compared with 88 % at $\frac{1}{8}$ inch. depth sowings

The best depth at which to sow red clover seeds in light loams appears to be $\frac{1}{2}$ to $\frac{3}{4}$ inch. Deeper sowings appear to have a deleterious effect on stem formation during the early stages of plant development. e. g. the average number of stems per plant at about 8 months after sowing, gave 2.2 for surface, 3.0 for $\frac{1}{8}$ inch depth. 2.6 for 1 inch. and 2.4 for 2 inches. Apparently also, the seedlings are unable to reach the surface when sown too deeply: this was proved by experiment, when the percentage of surface seedlings from seeds sown at a depth of more than 1 inch was nil.

WHITE CLOVER. — Similar results were obtained when surface sown except that in wet weather, comparatively satisfactory results were forthcoming on saturated soil. The best results, however, under normal conditions were obtained by covering the seeds to a depth of $\frac{1}{4}$ to $\frac{1}{2}$ inch. If covered to depths of over 1 inch, only a very small percentage of seedlings appeared to reach the surface, and when they did appear, the seedlings were very slender, and remained etiolated for some time.

Although the seedlings possess smaller cotyledon leaves than red clover and can therefore push their way more easily to the surface, this advantage is counterbalanced by the smaller amount of reserve food material at their disposal which doubtless explains their retardation and marked weakness.

PERENNIAL RYE GRASS. — It was proved that seeds should not be surface sown except during a long, unbroken spell of wet weather. The best results both as regards the number of surface seedlings and yields were obtained when the seeds were covered at depths varying from $\frac{1}{8}$ inch. to 1 inch. In a normal year, it would probably be safer, however, to cover to a depth of $\frac{1}{2}$ to 1 inch. At depths of 2 in. and 3 in. about $\frac{1}{3}$ and $\frac{6}{7}$ respectively of the seedlings failed to reach the surface and the subsequent yields of 21 oz. and 4 oz. of green fodder obtained compared very unfavourably with the 50 oz. given by the 1 inch beds. The deep sowings had also a weakening effect on the seedlings which did eventually reach the surface.

(1) The Latin names have been inserted by the Bureau. (Ed.)

COCKSFOOT. — Surface sowing were also disappointing. For field sowing the best depth appears to be about $\frac{3}{4}$ to $\frac{1}{2}$ in. A greater depth has proved inadvisable; the number of surface seedlings showed a steady decrease at deeper sowings, e. g. 50 % at 1 inch depth, 16 % at 2 inches compared with 69 % at $\frac{1}{8}$ inch. This is worthy of special note as cocksfoot is often included with seeds subjected to deeper sowing, and should be started under the most favourable conditions when placed in competition with quicker growing grasses such as the rye grasses. A very deep covering evidently has a detrimental effect on the tillering capacity of the young plant.

MEADOW FOXTAIL. — The best time for sowing appears to be either June or July. An interesting comparison of the germinating capacities of meadow foxtail and perennial rye grass in spring and also in summer is made. Apparently the rye grass seeds will germinate equally well during both seasons, but the foxtail will not germinate satisfactorily except during warm weather. That the best results are obtained when the seeds are sown in June or July was confirmed by an experiment in which the seeds were sown weekly from early May to August.

Satisfactory results were obtained from surface sowings in wet weather, but as the seeds are exceptionally light in weight, it is advisable always to cover, so that they may not be blown away. Although the experiments on meadow foxtail are not conclusive, it is considered that the seeds covered to depths of $\frac{1}{2}$ to $\frac{3}{4}$ inch will give good results, but that deeper sowings to a depth of 2 to 3 in. will result in complete failure.

ROUGH STALKED MEADOW GRASS. — The results indicate that the seeds should either be left uncovered, or buried very slightly, especially during wet weather; when the germination was interrupted by a spell of fine weather, the seeds gave better results when very lightly covered e.g., about $\frac{1}{8}$ in. to $\frac{1}{4}$ in.. The June and July sowings gave superior yields to the May and August sowings. The germination of the surface sown seeds is often delayed for as much as 6 weeks or more, even under normal conditions as regards moisture, but apparently shade and excessive moisture are conducive to good germination results. For instance surface sown pot cultures gave a 61-63 % of surface seedlings under shaded and excessive watering conditions respectively compared with 49 % when exposed to light and 57 % with normal watering.

In order to test the evidence given by the experiments here discussed, field trials designed largely to ascertain the depth of sowing under various operations, and to test the degree of excellence of the stands, were also conducted in 1920-21 and results are shortly to be published.

M. L. V.

691 - Studies on the Decomposition of some Common Green-Manuring Plants at different Stages of Growth in the Black Cotton Soil of the Central Provinces, India. — BAL, D. V., in *Agricultural Journal of India*, Vol. XVII, Pt. II, pp. 133-154, tables 8. Calcutta, March 1922.

Owing to the fact that black cotton soil, found throughout a large part of the Deccan (India), is so deficient in nitrogen and organic matter that

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cation of leaf nitrogen. As a result of the chemical determinations made in connection with the fibre resistance to the action of micro-organisms it is possible to attribute the reduction in nitrification with advanced age to the increasing amounts of fibre and the consequent comparatively non-available form of the nitrogen content. The increasing amount of carbohydrates, however, very probably exerts some deleterious influence on nitrification, but no definite opinion is given as regards this point. The regular decrease in moisture content with advancing age of the green manure is, however, considered to be partly responsible for the decrease in nitrification.

The nitrogen in the leaves of the sann-hemp is apparently more easily nitrified than that in the stems. During the experiments made, the decomposition of the leaves of mature sann hemp, covering a period of nearly 3 weeks, produced twice as much carbon dioxide as that of the stems. This indicates that when the plant is 12 weeks old, the leaf carbon is more readily oxidised than the carbon in the stems. The slowness of decomposition in fully matured green plants should not be attributed to any effect of the increasing proportion of stems in relation to leaves, but rather to the change in the physical condition of the plant tissues etc. The fact that the presence of stems does not affect oxidation of leaf carbon is indicated as follows :—

5 gm. leaves alone per 100 gm. soil gave off 183.1 mg. of carbon as carbon dioxide ;
5 gm. stems alone per 100 gm. soil gave off 128 mg. of carbon as carbon dioxide.

With *Sesbania aculeata*, there was no marked decrease in the rate of nitrification of the comparatively older plants, though there was a certain amount of decrease in the decomposition of carbonaceous constituents.

While these results throw some light on the quantitative rate of decomposition of the nitrogenous and carbonaceous constituents of green manuring plants, they also confirm the results obtained in experiments showing that sann hemp of about 6 weeks growth is in a condition to undergo rapid decomposition and so becomes of value to the succeeding crop ; the moisture factor should, however, not be overlooked. M. L. V.

992 - **The Effect of Straw on the Biological Soil Processes.** — MURRAY, T. G. in *Soil Science*, Vol. XII, No. 3, pp. 233-259, fig. 1, bibliography of 14 works New Brunswick, N. J., Sept. 1921.

In the wheat-growing areas to the east of Washington the return of straw to the land constitutes the only practical method of restoring organic matter to the soil, but it is known that this reduces the yield of the succeeding crop.

It was considered advisable to ascertain the reason for this reduction in crop yield, and if possible to devise a method by means of which the straw could be utilised without this drawback.

The matter had already received attention ; STÖRMER showed that the addition of carbon bisulphide to a soil treated with straw doubled the yield. VAN SEELHORST and FRECKMANN found that when nitrates